Harvey S. Tyler

Rhodora

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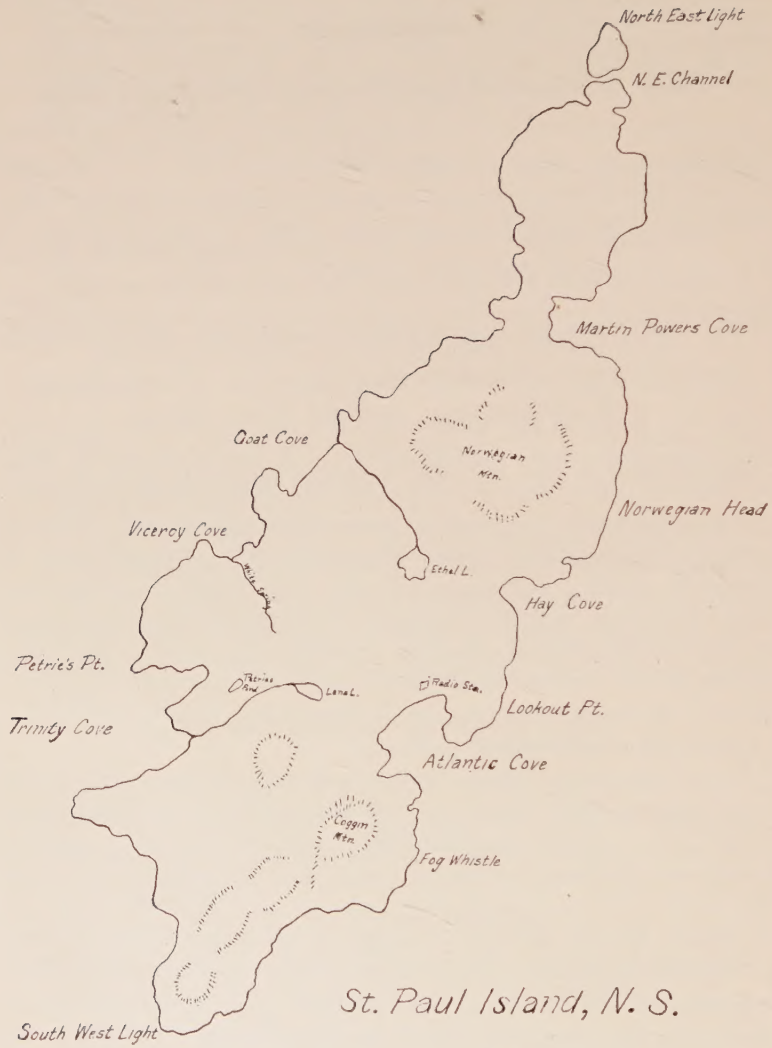
THE VASCULAR FLORA OF ST. PAUL ISLAND, NOVA SCOTIA

LILY M. PERRY

ST. PAUL, one of the smaller islands in the Gulf of St. Lawrence, lies about twelve miles northeast of Cape North, Nova Scotia. It is well-known that at least portions of the Magdalens, Anticosti and the Mingan Islands in the Gulf at some distance from the mainland escaped the Pleistocene denudation and consequently have been of particular interest phytogeographically. Presumably St. Paul also was far enough from the mainland to continue unglaciated, except perhaps locally; if so, its flora too might offer some interesting relics. This possibility and the smallness of the island induced Dr. Muriel V. Roscoe and me to spend a month's vacation there during the summer of 1929 collecting botanical specimens.

It was exceedingly difficult to obtain in advance much information concerning St. Paul. Apart from wireless and the government boats which carry supplies, equipment and employees, there is no regular means of communication with the mainland; no geological survey of the island has been made and consequently no topographic maps are available. Finally, however, Miss Roscoe discovered Miss Campbell, a former resident, who gave us many concrete facts about the place and supplied us with a map which, although drawn with the details of shipwrecks and currents especially for mariners, was invaluable to us in our work.

The island in outline is elliptical-oval, at best not more than a mile wide and approximately four miles long. About a quarter of a mile from the northeast end the sea runs through a narrow channel



MAP OF ST. PAUL ISLAND

so that, in fact, there are really two islands. The part cut off is perhaps a fifth of a mile wide and lacks trees or shrubs of any kind. On it are located the northeast light and the foghorn. A sliding cable with chairlike attachment serves as a means of transportation across the "Tittle" and here one receives as much of a thrill as if riding over the Niagara whirlpool. The island rises rather abruptly from the sea, although the surface is only moderately rolling with two slight elevations, Norwegian and Coggin mountains. On the summit of Coggin Mountain is a small bronze tablet set in concrete and stamped "for information write the Geodetic Survey of Canada." From Mr. Ogilvie, the Director of the Survey, I learned that this tablet is a triangulation station mark of the Geodetic Survey of Canada and its position is as follows: latitude 47° 11′ 40.2″ N., longitude 60° 09′ 06.2″ W., elevation 550 feet above the sea level. This particular station was used not only for the purpose of accurately locating the island and the lighthouses at either end, but also to aid in connecting points in Newfoundland to those in Nova Scotia.

From the economic point of view St. Paul Island is of little value, since for the most part it is covered with a somewhat stunted forest of balsam fir and white spruce. It is really a government station managed by the Department of Marine and Fisheries; and no person, unless shipwrecked, is permitted to land without the consent of the Canadian government. Last summer eight government employees with their families were living there. Although the history of the island will not be considered here, one thing should not be overlooked. Hitherto St. Paul has been a menace to seafaring people on the Gulf of St. Lawrence. The coast is rugged, rocky, irregular and without harbors. There are three or four coves where a stranger might expect to find shelter, but experience has proved them to be more dangerous during a storm than the open sea and the lee side of the island affords the only possible haven. Not only have storms played havoc with vessels but also bewildering fogs and unusually treacherous currents. Practically every little headland has received its name from some ship destroyed thereon. So numerous were the wrecks that, until the year 1924, a life-saving station was maintained on the island under the direction of a governor; and a crew of eight men patrolled the coast every day on the lookout for wrecks or ships in distress. Since that time, however, the Canadian government has established a radio direction-finding station and the operation of this practically elimin-

ates the probability of any large wreck. The operator of any boat or vessel carrying a wireless outfit may ask for and receive his bearing at any time of the day or night.

As early as 1883 we find the island-flora already studied by Dr. A. H. MacKay and his manuscript-list incorporated in Macoun's "Catalogue of Canadian Plants." Nevertheless, so great has been the progress in the field of systematic botany that earlier determinations are often obscure and many times characters have been misinterpreted; for this reason a restudy of the specimens in the light of present knowledge is necessary to establish their identities. For instance, Professor Fernald, while revising the genus *Oxytropis* in eastern North America, found that it had been reported from St. Paul island. Through inquiry, he learned that Dr. MacKay's record had been made on tentative field identification, hence the specimens were unavailable for further study. Since "no *Oxytropis* is known about the Gulf of St. Lawrence except in the Gaspé region and in western Newfoundland (four species)," Professor Fernald emphasized the fact that it was highly desirable to obtain specimens from St. Paul. He also suggested that the flora there would probably reveal significant geographic relationships. Now the scope of the island is too limited to attract outstanding field-botanists; but Miss Roscoe and I believed that here was a somewhat isolated unit whereby we might contribute something to the knowledge of the flora of Nova Scotia and at the same time profit by some valuable field-experience.

It seemed a relatively simple problem to get a boat to transfer us from the mainland to the island; nevertheless, after seeing people there wait ten days for favoring wind, tide and weather in order to go safely ashore, we realized how fortunate we had been to spend only one day at Bay of St. Lawrence. The weather was ideal for tenting and collecting specimens; yet, in spite of almost no fog nor rain, so great was the humidity that it was impossible to dry either specimens or driers out-doors.

In the vicinity of the Radio Station at Atlantic Cove were miniature gardens; and the few fields, at least in part, had been cultivated although not many genera have been introduced. The vegetation of the fields was various. The predominant grasses, *Anthoxanthum*, *Agrostis* and *Phleum*, were associated with a profusion of *Rumex Acetosella*, *Stellaria graminea*, *Ranunculus repens*, *R. acris*, *Euphrasia canadensis*, *E. americana*, *Rhinanthus Crista-galli* var. *fallax*, *Chrysan-*

themum Leucanthemum var., *Leontodon autumnalis* var. *pratensis, Cirsium arvense* and occasional patches of *Trifolium, Prunella, Galeopsis Tetrahit* var., *Plantago major* and *Centaurea nigra.* In the moister or more meadowy portions *Viola cucullata* and *Arenaria lateriflora* were the showy members of the plant-association. Near the base of one hill *Potentilla canadensis* var. *simplex* was growing with scattering bits of sphagnum. Invariably the dry rocky places were covered with *Sisyrinchium angustifolium, Potentilla tridentata, Vaccinium Vitis-Idaea* var. *minus* and clumps of *Iris versicolor.* Instead of *Spiraea* on the open slopes, *Sanguisorba canadensis* var. *latifolia* grew in abundance. This Alaskan variety has been collected in Quebec at Natashquan and Pontchartrain, and on the island of Anticosti, but apparently has not been known south of Anticosti.

Bordering the swamp of this region was a somewhat solid turf of *Glyceria canadensis, Scirpus rubrotinctus, S. atrocinctus, Eriophorum virginicum, Carex scoparia, Juncus filiformis* and *Luzula campestris* var. *multiflora.* Beyond this the ground was spongy. Usually *Carex stellulata* var. *cephalantha* and *C. paupercula* filled the margins of little "bog-holes." The larger part of the swamp was covered with tussocks of *Scirpus cespitosus* var. *callosus* supplemented in open spots by *Rynchospora alba* and *Epilobium palustre* var. *monticola.* The whole area was interspersed with *Eriophorum angustifolium, Habenaria dilatata, H. fimbriata, Sarracenia purpurea* and a few clumps of *Iris versicolor.* Just beyond in a typical sphagnum bog the inconspicuous *Malaxis unifolia* was growing with an abundance of *Habenaria clavellata* and *Equisetum arvense,* and nearby a scrubby fir concealed a meagre specimen of *Kalmia polifolia,* a species not noted elsewhere on the island.

Owing to zones of dense undergrowth of brushwood, travelling in the forest was exceedingly difficult and in many places well-nigh impossible. Sometimes the scrub was sufficiently compact to carry our weight, but oftener it swallowed us and we had to hunt for a way through. The flora of the woods varied scarcely at all in the different regions. *Athryium angustum*, var. *rubellum, Thelypteris, Phegopteris, T. spinulosa* vars., *Clintonia, Maianthemum, Streptopus, Habenaria obtusata, Coptis, Ribes glandulosum, Aralia nudicaulis, Cornus canadensis, Moneses, Pyrola, Monotropa, Trientalis, Linnaea, Solidago macrophylla, Aster acuminatus* and *Prenanthes trifoliolata* were everywhere. *Empetrum nigrum* or *Chiogenes hispidula* covered the

exposed knolls and *Carex trisperma* carpeted the little swales and glades. Southeast of Lena Lake, *Polypodium virginianum, Taxus canadensis, Lycopodium lucidulum, Mitella nuda, Oxalis montana* and *Viola incognita* were frequent. The forest flora, however, was not entirely uninteresting. *Carex crinita* var. *simulans* collected in a swale on the east slope of Coggin Mountain, although known from Newfoundland to Massachusetts chiefly in the mountains, is reported for the first time from Nova Scotia; also *Solidago uniligulata* var. *neglecta* not definitely reported east of Yarmouth county was fairly abundant here. The prevailing tree was *Abies balsamea* although *Picea canadensis* was generally distributed throughout. Possibly an occasional "bog" spruce grew there, but we failed to find any in our cruising. The chief deciduous elements were *Alnus, Betula, Acer, Pyrus, Amelanchier, Lonicera, Viburnum*, and *Sambucus*. These were not plentiful nor were they much larger than undershrubs. *Lonicera canadensis* reaches its northeastern range-limit on St. Paul, and *Amelanchier Fernaldii*, a native of the region about the Gulf of St. Lawrence, is an addition to the Nova Scotian flora

On account of the high winds and salt spray the border of the forest was greatly dwarfed. Often the firs were simply flattened dense mats which grew to the very edge of the sea-cliffs; but, between the woods and the cliffs were also stretches of barren which yielded a variety of interesting things. The barrens were nearly always on headlands and similar in character, although usually each was marked by some species lacking in the others. Here and there in slightly protected places stunted trees weathered the gales, but *Empetrum nigrum* flourished regardless of shelter. Occasionally sprawled with it were *Juniperus horizontalis* and *J. communis* var. *megistocarpa* similar in habit to var. *montana* yet distinguished by larger berries with larger seeds. This variety was described from Sable Island, but it also occurs on the Magdalen Islands and in western Newfoundland. On the broad barren, *Agrostis, Ammophila, Deschampsia flexuosa, Smilacina stellata, Iris setosa* var. *canadensis, Euphrasia, Solidago bicolor* and *Aster novi-belgii* were the general vegetative elements. *Equisetum, Agropyron, Carex hormathodes, C. silicea, C. maritima* or *Juncus balticus* var. *littoralis* filled the damp or sphagnous depressions. At the southwest end of the island some two hundred feet above the sea level, *Vaccinium uliginosum* var. *alpinum*, much cropped by the goats, maintained a struggle for existence. Near West Point the boreal

species *Cornus succica* grew in abundance and close by a colony of *Anaphalis margaritacea* f. *anochlora* prospered. The barren at Trinity Cove was by far the largest, yet its vegetation contained only three particularly interesting things: *Deschampsia flexuosa* var. *montana*, *Rhinanthus groenlandicus* and *Campanula rotundifolia* var. *alaskana*. These natives of Newfoundland and Gaspé are here noted for the first time from Nova Scotia. To this enumeration of boreal species should be added *Silene acaulis* var. *exscapa* (abundant also at the southwest of the island), *Salix Uva-ursi*, *S. cordifolia* var. *callicarpaea* and *Solidago multiradiata*, all collected on a little slope south of the "Tittle" (North East Channel), the two latter the first from south of Newfoundland, Anticosti and Gaspé.

Near the sea cliffs, *Plantago juncoides* var. *decipiens* replaced the *Gramineae*. Along the upper edges of the bluffs were mats of *Cerastium arvense* or *Lathyrus maritimus* and clumps of *Sedum roseum*. At the northeast *Oxytropis johannensis* grew in profusion. This, the only member of the genus known from Nova Scotia, has not been found farther south in Newfoundland than Cape St. George, although it occurs in Quebec, Maine and east along the upper St. John river in New Brunswick. The chief crevice plants were *Puccinellia paupercula* var. *alaskana*, *Festuca rubra* var., *Sagina procumbens*, *Plantago juncoides* var. *decipiens* and *Solidago sempervirens*.

St. Paul rises so abruptly from the sea that it is unsafe to try to reach the water from more than three or four points on the island. Logically enough there is a characteristic lack of beaches. Nevertheless, on the west coast a small sand beach has developed, and in other places below the cliffs sandy margins are appearing. The beach below West Landing maintained a few beach-types: *Mertensia maritima* growing in mats from 6 inches to 2 feet in diameter, *Atriplex maritima* var. *hastata*, *Cakile edentula*, *Polygonum Raii* and *Arenaria peploides* var. *robusta* (a single specimen of each of the last two).

While scouting to obtain the lay of the land, we discovered apparently a low open stretch in the forest northeast of Petrie's Pond. We were eager to explore it, but, since the vegetation of the barren was more mature owing to its exposed location, we bent our efforts in that direction. We started at West Landing and, after following the Trinity Cove barren almost to Petrie's Point, we came to a slight ridge marking a definite change in the plant-association. On the other side of the elevation, a little stream was trickling from a series of

shallow pools and sunken spots of ooze or slimy mud. The locality was too fascinating to resist. From the pools we took *Equisetum arvense* f. *decumbens* and *Triglochin palustre*. We were puzzled by a network of delicate strands on the ooze; however, thinking they were probably indeterminable, we passed them by for species manifestly not yet represented in our collection: *Selaginella selaginoides* nestling under sedge tussocks and tiny banks, *Panicum boreale, Danthonia spicata, Carex gynocrates* (rare on the island and new to Nova Scotia), *C. Oederi* var. *pumila, Thalictrum polygamum, Potentilla fruticosa, Primula mistassinica* and *Pinguicula vulgaris*. It was impossible to pick up everything that day so we planned to return the following Monday. A heavy rain on Sunday swelled the brooklet and filled the oozy hollows with water. Imagine our surprise to find some pools almost choked with submersed masses of *Utricularia minor*. The specimens were coarser than those of the typical form, the bladders larger and the leaves flattened rather than capillary. There is a form *platyloba* which occurs wherever the plant creeps from the water into a muddy habitat, and I am inclined to believe that our slightly abnormal specimens may be the result of ecological conditions under which they live.

The stream drained a boggy meadow in which grasses and sedges were predominant. Here we gathered *Agrostis hyemalis, Calamagrostis canadensis, Scirpus cespitosus* var. *callosus, S. hudsonianus, Eriophorum viridi-carinatum, Carex pauciflora, C. rostrata* and var. *utriculata, Epilobium palustre* var. *monticola, Andromeda glaucophylla* and, curiously enough, *Gaultheria procumbens*. Bordering the expanse was a thicket of *Betula pumila, Pyrus dumosa, Rubus recurvicaulis, Rosa nitida, Acer rubrum, Lonicera villosa* var. *Solonis* and other common types. The swampy and boggy area in one direction was lying adjacent to Petrie's Pond and proved to be the section we had wished to explore. At the opposite end, it opened into a larger bog dotted with a number of small ponds often individual as to floral specialty, usually one of the following: *Sparganium angustifolium, Potamogeton epihydrus, Lycopodium Selago, L. inundatum* or *Juncus canadensis*. Here *Carex Howei*, a coastal plain species, reaches its present northern limit. Just beyond the immediate source of White Spring (the stream draining the bog) a beautiful patch of *Pogonia ophioglossoides* flourished and scattering specimens of *Solidago uniligulata* var. *neglecta* were beginning to blossom.

Apart from the brooklet already mentioned, the streams and their banks were disappointing botanically. This was probably owing to their smallness and the rapidity of the flow of water as well as to the wetness of the land in general. The lakes, Ethel and Lena, were more attractive. In Ethel Lake the wading was good and we added to our list *Isoetes macrospora, Eriocaulon septangulare, Nymphozanthus variegatus, Lysimachia terrestris* and *Lobelia Dortmanna.* The latter is slightly aberrant in that the lip of the corolla is somewhat more coarsely and profusely pubescent than that of the typical form and the protrusion of the pubescence causes the sinuses between the lobes to appear ciliate. Lena Lake was a different proposition. We had been warned to keep away from the lower end if we valued our lives. The muddy bottom, although seemingly solid, had several times given way suddenly, so that it was impossible to ascertain the real depth of water. But alas, here if anywhere ought to be good collecting. The vegetation grew from the margin nearly to the middle of the lake. We visited the place soon after landing and noted that the plants were too immature to collect; incidentally, we discovered by stepping into the water, that good-sized leeches were there in abundance. Just before leaving the island, we went back again to pick up whatever we could without venturing too far from the bank. In three weeks' interval a huge colony of *Scirpus acutus* had grown from a narrow strip along the margin almost to the centre of the lake. We obtained *Potamogeton Oakesianus, Scirpus subterminalis, Carex rostrata* var. *utriculata, Juncus militaris, Utricularia geminiscapa, U. ochroleuca, Aster nemoralis* and var. *major. U. ochroleuca* has been reported in North America only from Greenland; and while this may appear to be a long range-extension, both Professor Fernald and I believe that the specimens (which unfortunately are sterile) compare favorably with authentic material of this species of Hartman in the Gray Herbarium. Petrie's Pond was very small and had a quaking margin from which grew a profusion of *Carex limosa.*

It was our aim to make a complete collection of the vascular flora of St. Paul. Unfortunately, we did not reach a small part of the island, reserved for a last venture since we had been assured that it was almost inaccessible. Four days in advance, we knew that a boat was coming from the mainland for a government official and that we might return with him. By working into the wee small hours of the morning, we had hoped to clear our presses and yet to have left an entire day in

which to pick up at least one specimen of each of the desirable plants of Mica Head, the unexplored region. We had not one day but four so filled with heavy fog that this last field-trip faded into an impossibility. In spite of the lacuna, our collection is fairly representative of the flora of St. Paul. It includes about 2360 sheets of specimens, in all 418 numbers embracing 160 genera and approximately 300 species and varieties. In large part, these are common to the flora of Nova Scotia; some are found only in Cape Breton and St. Paul, while others, 20 in all, were collected in the province for the first time last summer and most of them illustrate definite range-extensions from the north. It is significant that these northern plants are characteristic of slightly or not at all glaciated regions in Newfoundland, Quebec, Anticosti or the Magdalen Islands; hence, if I may draw a parallel conclusion, it seems not unreasonable to infer that St. Paul also escaped denudation by the Wisconsin ice-sheet.

I am under obligation to many people who have aided me throughout my work on the flora of St. Paul Island. First of all, I wish to express my appreciation to Professor Fernald both for suggesting the trip and for the expert assistance and criticism which he has kindly and promptly given from the beginning of our preparation. To Dr. B. L. Robinson, I am deeply grateful for the generous support which made this trip possible, as well as for the personal interest he has shown in the work. I am greatly indebted to all the Canadian government officials and employees who contributed to the success and pleasure of our little expedition. I wish particularly to thank Mr. E. W. Hawken, Assistant Deputy Minister of the Marine Department, and Mr. C. H. Harvey, Agent of Marine and Fisheries at Halifax, for permission to visit the island; Major J. J. McLean, Superintendent of Lighthouses, for shipping our equipment on the "Lady Laurier" and also for many other courtesies; and Mr. H. M. Sutherland, Division Superintendent of Radio, for the special favor of permitting us to board at the Wireless Station. I take much pleasure in thanking Miss Campbell for a map of the island which greatly facilitated our work; and, I am highly appreciative of the helpful and courteous assistance of the government employees during our sojourn on the island. Their spirit of friendliness added much to the enjoyment of our work there.

Vascular Plants collected on St. Paul Island, 1929

In the following list, the names of the species marked * are recorded for the first time, apparently, from Nova Scotia. The introduced species are in italics.

Polypodium virginianum L. Between Atlantic Cove and Lena Lake. Fairly common on the southern half of the island.

Pteridium latiusculum (Desv.) Hieron. Common.

Athyrium angustum (Willd.) Presl. var. rubellum (Gilbert) Butters. Frequent throughout the woods.

Thelypteris Phegopteris (L.) Slosson. Abundant everywhere.

T. noveboracensis (L.) Nieuwl. General in the open woods.

T. spinulosa (O. F. Muell.) Nieuwl., var. intermedia (Muhl.) Nieuwl. Common.

T. spinulosa (O. F. Muell.) Nieuwl., var. americana (Fisch.) Weatherby. Common.

Almost as abundant as the two varieties just mentioned was a form transitional between the two.

Osmunda regalis L., var. spectabilis (Willd.) Gray. Margin of Petrie's Pond and Lena Lake.

O. Claytoniana L. Occasional on the southeast side of the island.

O. cinnamomea L. Frequent in the swampy region of Atlantic Cove.

Equisetum arvense L. Common.

E. arvense L., f. decumbens (Meyer) Klinge. Muddy bottom of stream between Petrie's Pond and White Spring.

E. sylvaticum L., var. pauciramosum Milde. Woods near the Radio Station. Rare in Nova Scotia.

Lycopodium Selago L. By margin of a water-hole in a bog above Petrie's Pond. Rare.

Previously collected in Nova Scotia on the Barrasois River, Cape Breton.

L. lucidulum Michx. General southeast of Lena Lake.

L. inundatum L. Muddy margin of water-hole, bog at head of White Spring.

L. clavatum L. Dry hillock near the path to the North East Light.

Neither this nor the following species were seen elsewhere on the island.

L. obscurum L. Dry hillock near the path to the North East Light.

Selaginella selaginoides (L.) Link. Borders of tussocks; overhanging margins of sluggish stream; between Petrie's Pond and White Spring. Rare.

Isoetes macrospora Dur. Abundant in Ethel Lake.

Not frequent in the province.

Taxus canadensis Willd. General on the southern part of the island.

Picea canadensis (Mill.) BSP. Commonly distributed throughout the forest.

Abies balsamea (L.) Mill., var. phanerolepis Fernald. Everywhere. This rather than the typical form is the predominant tree on the island.

Juniperus communis L., var. megistocarpa Fernald & St. John. Border of forest, Trinity Cove.

Known also on Sable Island, Nova Scotia.

J. communis L., var. montana Ait. Trinity Cove barren. Not plentiful.

J. horizontalis Moench. Common along the west side of St. Paul.

Sparganium chlorocarpum Rydb., var. acaule (Beeby) Fernald. Mud-hole by dam near Atlantic Cove.

S. angustifolium Michx. Miry pond in bog at head of White Spring.

Potamogeton Oakesianus Robbins. Shallow water, Lena Lake.

P. epihydrus Raf. Pond in bog above Petrie's Pond.

Zostera marina L. In wash of tide.

Triglochin maritima L. Stagnant pool in rocks, North East Light.

T. palustris L. Sluggish stream between Petrie's Pond and White Spring.

Panicum boreale Nash. Banks of stream just mentioned.

Anthoxanthum odoratum L. Abundant in all the open places.

Milium effusum L. Woodland, southeast slope of Coggin Mountain.

Oryzopsis asperifolia Michx. Wooded hillsides near Trinity Cove.

Phleum pratense L. Common in abandoned fields.

Agrostis stolonifera L., var. compacta Hartm. Barren slopes.

A. hyemalis (Walt.) BSP. Bog at head of White Spring. The awned form.

A. tenuis × A. stolonifera. [Det. *Dr. M. O. Malte*]. Atlantic Cove.

Calamagrostis Pickeringii Gray. Bog above Petrie's Pond. This grass is rare on the island.

C. canadensis (Michx.) Nutt. Abundant in exposed places. The predominant grass on St. Paul.

Ammophila breviligulata Fernald. Wind-swept barren, Trinity Cove. Not noted elsewhere.

Cinna latifolia (Trev.) Griseb. Woodland between Whistle Point and South West Light.

Deschampsia flexuosa (L.) Trin. General on the barren and in the woods on the west side of the island.

*D. FLEXUOSA (L.) Trin., var. MONTANA (L.) Ledeb. Barren, Trinity Cove.

Var. *montana* is essentially a plant of the northern regions. It is known from Greenland, Labrador, Newfoundland and Quebec (Gaspé and Matane Counties). This is the first collection south of Quebec.

Avena sativa L. Waste places, Atlantic Cove.

DANTHONIA SPICATA (L.) Beauv. Occasional in rocky places.

SPARTINA MICHAUXIANA Hitchcock. Near edge of sea-cliffs, slope southwest of N. E. Channel.

We were very much surprised to find this plant of river banks and other wet habitats growing with *Carex silicea* in a sheltered spot at least fifty feet above the sea level, but evidently it derived sufficient moisture from the drainage of the land above it to thrive.

Poa pratensis L. Occasional, Atlantic Cove.

P. trivialis L. Waste places, Atlantic Cove.

GLYCERIA CANADENSIS (Michx.) Trin. Border of swamp, Atlantic Cove.

PUCCINELLIA PAUPERCULA (Holm) Fernald & Weatherby, var. ALASKANA (Scribn. & Merr.) Fernald & Weatherby. Crevices of rocks, North East Light.

FESTUCA RUBRA L. Rocky slopes, North East Light.

*FESTUCA RUBRA L., var. ARENARIA (Osbeck) Fries. With *F. rubra.*

Var. *arenaria* is another native of northern lands; it has been collected previously in Greenland, Newfoundland and Quebec (Matane and Gaspé Counties).

F. RUBRA L., var. JUNCEA (Hack.) Richter. Crevices of cliffs, Trinity Cove.

Agropyron repens (L.) Beauv. Waste places.

*A. CANINUM (L.) Beauv., var. HORNEMANNI (Koch) Pease & Moore. Barren, Trinity Cove.

Var. *Hornemanni* has been reported as far south as the alpine region of New Hanpshire, but I have not found anything to indicate that it has been collected previously in Nova Scotia.

ELEOCHARIS PALUSTRIS (L.) R. & S., var. MAJOR Sonder. Near the margin of Lena Lake. Scarce.

SCIRPUS CESPITOSUS L., var. CALLOSUS Bigel. Common in bogs.

S. HUDSONIANUS (Michx.) Fernald. Peat bog between Petrie's Pond and White Spring. Only a few patches seen.

S. SUBTERMINALIS Torr. Shallow water, Lena Lake.

S. ACUTUS Muhl. Petrie's Pond and Lena Lake.

S. RUBROTINCTUS Fernald. General in swampy land.

S. ATROCINCTUS Fernald. Swamp, Atlantic Cove.

Eriophorum angustifolium Roth. General in bogs and swamps.
E. viridi-carinatum (Engelm.) Fernald. Occasional in bogs.
E. virginicum L. Abundant in swamp, Atlantic Cove.
Rynchospora alba (L.) Vahl. Bogs.
Carex hormathodes Fernald. Wet hollow in barren, Trinity Cove.
C. Howei Mackenzie. Peat bog at head of White Spring.

This is a southern species which as yet has not been found farther north.

C. scoparia Schkuhr. Common.
C. silicea Olney. Barren near the edge of the sea cliffs.
*C. gynocrates Wormsk. Bog between Petrie's Pond and White Spring. Rare.
C. exilis Dewey. Sphagnous margin of Petrie's Pond.
C. stellulata Good., var. cephalantha (Bailey) Fernald. Common.
C. interior Bailey. Peat bog at head of White Spring.
C. brunnescens Poir., var. sphaerostachya (Tuckerm.) Kükenth. Frequent in the open woods.
C. trisperma Dewey. Wet mossy fir woods near Lena Lake.
C. stipata Muhl. Occasional in swales.
C. maritima O. F. Muell. Swales on barren, also in muddy pockets in rocks.
C. crinita Lam., var. gynandra (Schwein.) Schwein. & Torr. Swamp in woods near the Radio Station.
*C. crinita Lam., var. simulans Fernald. Woodland, Coggin Mountain.
C. Goodenowii Gay. Profuse everywhere.
C. pauciflora Lightf. Bog above Petrie's Pond.
C. Buxbaumii Wahlenb. Swamp near Petrie's Pond.
C. novae-angliae Schwein. Norwegian Head.
C. paupercula Michx. Common in swampy regions.
C. limosa L. Floating out from the margin of Petrie's Pond.
C. Oederi Retz., var. pumila (Coss. & Germ.) Fernald. Occasional in hollows on the barren or near the sea cliffs.
C. arctata Boott. Occurring casually in the open woodland.
C. debilis Michx., var. Rudgei Bailey. Swampy woods near the Radio Station.
C. intumescens Rudge. By streamlet from the dam near the Radio Station.
C. rostrata Stokes. Swamp near Petrie's Pond.
C. rostrata Stokes, var. utriculata (Boott) Bailey. Shallow water, Lena Lake.
Eriocaulon septangulare With. Ethel Lake.
Juncus bufonius L. Abundant everywhere on open spots.
J. tenuis Willd. Common along paths.
J. balticus Willd., var. littoralis Engelm. Windswept barren, Trinity Cove southwest.

J. FILIFORMIS L. Swale, Atlantic Cove.

J. EFFUSUS L., var. SOLUTUS Fernald & Wiegand. Margin of Lena Lake.

J. EFFUSUS L., var. COMPACTUS Lej. & Court. Frequent.

J. BREVICAUDATUS (Engelm.) Fernald. Abundant between Lena Lake and Petrie's Pond.

J. CANADENSIS J. Gay. Peat bog at head of White Spring. Rare.

J. MILITARIS Bigel. Shallow water, Lena Lake.

J. ARTICULATUS L. Common in open places.

J. ARTICULATUS L., var. OBTUSATUS Engelm. Wet path toward the North East Light.

LUZULA SALTUENSIS Fernald. Norwegian Head.

L. CAMPESTRIS (L.) DC., var. MULTIFLORA (Ehrh.) Čelak. Common in fields.

*L. CAMPESTRIS (L.) DC. var. COMOSA (Meyer) Fernald & Wiegand. Woodland path near Lena Lake.

This variety, generally distributed from Montana west and northwest, has been collected in eastern America, in western Newfoundland and at one station in Gaspé County, Quebec.

CLINTONIA BOREALIS (Ait.) Raf. Abundant throughout the woods.

SMILACINA STELLATA (L.) Desf. Common on the barrens.

MAIANTHEMUM CANADENSE Desf. General in the forest.

STREPTOPUS AMPLEXIFOLIUS (L.) DC. Frequent at the southwest end of the island.

S. ROSEUS Michx. Fairly well distributed throughout the woodland.

IRIS VERSICOLOR L. In swamps and on dry rocky places.

I. SETOSA Pall., var. CANADENSIS Foster. Near the cliffs on headlands and barrens.

SISYRINCHIUM ANGUSTIFOLIUM Mill. Common.

HABENARIA DILATATA (Pursh) Gray. Usual in bogs.

H. CLAVELLATA (Michx.) Spreng. Sphagnum bog, Atlantic Cove.

H. OBTUSATA (Pursh) Richardson. Everywhere in the woods.

H. FIMBRIATA (Ait.) R. Br. Fields bordering the woodland.

POGONIA OPHIOGLOSSOIDES (L.) Ker. Growing in profusion, peat bog at head of White Spring.

CALOPOGON PULCHELLUS (Sw.) R. Br. Occasional in bogs and swamps.

LISTERA CORDATA (L.) R. Br. Damp woods near Lena Lake.

MALAXIS UNIFOLIA Michx. Sphagnum bog, Atlantic Cove.

*SALIX UVA-URSI Pursh. Wind-swept barren southwest of N. E. Channel.

Although this species ranges farther south on the alpine summits of New England and New York, probably this locality is the southern limit of its growth near the sea-level.

*S. CORDIFOLIA Pursh, var. CALLICARPAEA (Trautv.) Fernald. (Prostrate). Barren at the north end of the main island.

"Var. *callicarpaea* is common from northern Labrador to northwestern Newfoundland and the Shickshock Mountains, Quebec".

Myrica caroliniensis Mill. Bogs. Scarce.

Betula papyrifera Marsh. Infrequent, but general.

B. pumila L. Bogs. Casual.

This species has been collected by Nichols in Cape Breton but it is not commonly distributed through the province.

Alnus crispa (Ait.) Pursh, var. mollis Fernald. Fairly common.

*Geocaulon lividum (Richardson) Fernald. Barren near Petrie's Pond.

Rumex crispus L. Abundant in old fields.

R. obtusifolius L. Interspersed with the last named species.

R. Acetosella L. Apparently profuse in the fields and occasional on the barrens.

Polygonum aviculare L. Atlantic Cove. Weed.

P. Persicaria L. Atlantic Cove. Weed.

P. scabrum Moench. Atlantic Cove. Weed.

P. Raii Babington. Sand beach beyond West Landing. Only one plant seen.

Chenopodium album L. Occasional on hillsides.

Atriplex patula L., var. hastata (L.) Gray. Sand beach beyond West Landing. Scarce.

Spergularia leiosperma (Kindberg) F. Schmidt. Grassy slope, North East Light.

Sagina procumbens L. The characteristic plant of rock crevices.

Arenaria lateriflora L. Wet grass-land, Atlantic Cove.

Stellaria borealis Bigel., var. floribunda Fernald. Between West Landing and South West Light. Rare.

S. graminea L. Common in fields.

S. media (L.) Cyrill. Waste places.

Cerastium arvense L. Edge of cliffs, Trinity Cove.

C. vulgatum L. Old cellar, Trinity Cove.

*Silene acaulis L., var. exscapa (All.) DC. Abundant at the southwest end of the island, also south of N. E. Channel practically at sea level.

This is the first record near sea level southwest of Newfoundland.

Nymphozanthus variegatus (Engelm.) Fernald. Ethel Lake.

Nymphaea odorata Ait., var. rosea Pursh. Petrie's Pond and Lena Lake.

Ranunculus Cymbalaria Pursh. Grassy slope, North East Light.

R. acris L. Abundant in fields.

R. repens L. Vying with the last named species in profusion.

Thalictrum polygamum Muhl. General, variable; on rolling slopes up to 1 m. high, in bogs as small as 3 dm. in height.

Coptis groenlandica (Oed.) Fernald. Common in the forest.

Actaea rubra (Ait.) Willd. Open woods at the foot of Coggin Mountain. Not seen elsewhere on the island.

Thlaspi arvense L. Between West Landing and South West Light.

Capsella Bursa-pastoris (L.) Medic. Weed, Atlantic Cove.

Cakile edentula (Bigel.) Hook. On cliffs and sand beach.

Brassica juncea (L.) Cosson. Weed near the Radio Station.

B. arvensis (L.) Ktze. Waste places.

Sarracenia purpurea L. Plentiful in bogs.

Drosera rotundifolia L. Abundant in open spots.

Sedum roseum (L.) Scop. Common on cliffs and rocky knolls.

Mitella nuda L. Deep woods south east of Lena Lake. General.

Ribes glandulosum Grauer. Frequent on the southern part of the island.

R. hirtellum Michx. Generally distributed but casual.

Pyrus arbutifolia (L.) L. f., var. atropurpurea (Britt.) Robinson. Rocky margins of the lakes.

*× P. Arsenii (Britton) Arsène. (*P. arbutifolia* var. *atropurpurea* × *P. dumosa*). Frequent.

P. dumosa (Greene) Fernald. Thicket bordering bog above Petrie's Pond.

*Amelanchier Fernaldii Wiegand. Margin of Ethel Lake.

The species thus far is restricted in its distribution to the Gulf of St. Lawrence region. It has been collected on the Magdalens, Anticosti, Quebec (along the lower St. Lawrence), Newfoundland and, now, St. Paul.

A. Bartramiana (Tausch.) Roemer. Between Ethel Lake and Atlantic Cove.

Fragaria virginiana Duchesne, var. terrae-novae (Rydb.) Fernald & Wiegand. By the dam near the Radio Station. General.

Potentilla norvegica L., var. hirsuta (Michx.) Lehm. Near the Radio Station. Not noted elsewhere.

P. canadensis L. var. simplex (Michx.) T. & G. Wet slope, Atlantic Cove.

P. pacifica Howell. Rocky slopes and near margins of cliffs.

P. tridentata Ait. Rocky places. Common.

P. fruticosa L. Bogs.

Rubus idaeus L., var. canadensis Richardson. Occasional in the woods.

R. Chamaemorus L. Fairly general in bogs.

R. pubescens Raf. Abundant in the open places.

R. recurvicaulis Blanchard. Peat bog at head of White Spring. Rare.

*Sanguisorba canadensis L., var. latifolia Hook. Frequent on grassy slopes.

An Alaskan variety heretofore known in the east only from the

north shore of the St. Lawrence River (two stations), Quebec and the island of Anticosti.

Rosa nitida Willd. Casual in boggy places.

Prunus pennsylvanica L. f. Top of Coggin Mountain, also between Lena Lake and Petrie's Pond. Rare on the island.

Trifolium pratense L. Fields.

T. repens L. Near edge of cliffs, Money Rocks.

*Oxytropis johannensis Fernald. Abundant at the northeast end of St. Paul.

Although this species has not been collected in Newfoundland south of Cape St. George, its range extends south from Quebec into Maine and east along the upper St. John River in New Brunswick. This is undoubtedly the plant reported in Macoun's Catalogue (i. 115) from St. Paul as *O. uralensis*, var. *pumila*, and later (i. 509) as *O. arctica*.

Vicia angustifolia (L.) Reichard, var. *segetalis* (Thuillier) Koch. Weed, Atlantic Cove.

Lathyrus maritimus (L.) Bigel. Border of cliffs, Trinity Cove.

L. palustris L., var. macranthus (T. G. White) Fernald. Grassy slope, North East Light.

Although found in Nova Scotia, it is more plentiful farther north.

Oxalis montana Raf. Common in the forest of the southern half of the island.

Empetrum nigrum L. Very abundant in all the open habitats.

Ilex verticillata (L.) Gray. Occasional in bogs.

Nemopanthus mucronata (L.) Trel. Bog south east of Lena Lake.

Acer spicatum Lam. Woodland between Lena Lake and West Landing.

A. rubrum L. Thicket bordering the bog above Petrie's Pond. None of the specimens seen were larger than shrubs.

Hypericum canadense L. Path, near Lena Lake. Scarce.

Viola cucullata Ait., f. prionosepala (Greene) Brainerd. Fields.

V. pallens (Banks) Brainerd. Sphagnous depressions on barren, also in the forest. General.

V. incognita Brainerd. Deep woods southeast of Lena Lake.

Epilobium angustifolium L. Atlantic Cove.

E. glandulosum Lehm., var. adenocaulon (Haussk.) Fernald. Open woods, Atlantic Cove.

E. palustre L., var. monticola Hausskn. Common in bogs.

Oenothera perennis L. Waste places, Atlantic Cove.

Circaea alpina L. Dripping slope of open woods, Coggin Mountain.

Aralia nudicaulis L. A characteristic woodland species.

Carum Carvi L. Weed, Atlantic Cove.

Ligusticum scothicum L. Rocky slopes usually near the cliffs.

Heracleum lanatum Michx. Swale, Coggin Mountain.

Conioselinum chinense (L.) BSP. Fairly general on the island, but apparently not so in the province.

*Cornus suecica L. Sphagnous depression in barren, Trinity Cove southwest.

This boreal species occurs in Greenland, Newfoundland, Quebec, Anticosti, the Magdalens, St. Paul and Alaska. After collecting several sheets of the material at Trinity Cove, Miss Roscoe and I noticed near Martin Power's Cove an abundance of *Cornus*, the berries of which were very like this species but the leaves were much larger. In passing we thought it *C. succica*, but I now believe it was rather *C. canadensis* var. *intermedia* Farr. However, since we took no specimens, I cannot make this statement with surety.

C. canadensis L. Common.

Moneses uniflora (L.) Gray. Common in the woods.

Pyrola chlorantha Sw. Woodland near Lena Lake.

P. secunda L. Casual in the woods.

Monotropa uniflora L. Frequent.

Ledum groenlandicum Oeder. Well distributed but not anywhere abundant.

Kalmia angustifolia L. Chiefly at Atlantic Cove.

K. polifolia Wang. Sphagnum bog, Atlantic Cove. Not seen elsewhere.

Andromeda glaucophylla Link. Bog above Petrie's Pond. Scarce.

Chamaedaphne calyculata (L.) Moench. Bog on the left of the path to North East Light.

Gaultheria procumbens L. Bog above Petrie's Pond.

Chiogenes hispidula (L.) T. & G. Abundant on knolls in open woodland.

Gaylussacia dumosa (Andr.) T. & G., var. Bigeloviana Fernald. Bog on the left of the path to North East Light.

Vaccinium Vitis-Idaea L., var. minus Lodd. Frequent.

*V. Oxycoccus L., var. intermedium Gray. Near cliffs, Lookout Point.

V. pennsylvanicum Lam. Woods, Atlantic Cove. Rare.

V. uliginosum L., var. alpinum Bigel. Upper slope of headland, West Point; South West Light.

Previously collected by Nichols on the mountains west of Ingonish, but not generally distributed in Nova Scotia.

Primula mistassinica Michx. Banks of streamlet between Petrie's Pond and White Spring.

Lysimachia terrestris (L.) BSP. Shallow water, Ethel Lake.

Trientalis borealis Raf. Common in the forest.

Glaux maritima L., var. obtusifolia Fernald. Rocky slope, North East Light.

Halenia deflexa (Sm.) Griseb. Hillside, Martin Power's Cove.

This species is listed by Nichols (Vegetation of Northern Cape Breton, 324, 1918) as common on bleak exposed headlands. I do not find any other record of its occurrence in the province.

Menyanthes trifoliata L., var. minor Michx. Stagnant pools and bogs.

Convolvulus sepium L., var. pubescens (Gray) Fernald. Atlantic Cove.

Mertensia maritima (L.) S. F. Gray. Sand beach beyond West Landing.

Prunella vulgaris L., var. lanceolata (Barton) Fernald. Fields, Atlantic Cove.

Galeopsis Tetrahit L., var. *bifida* (Boenn.) Lej. & Court. Waste places, Atlantic Cove.

Lycopus uniflorus Michx. Open places. Infrequent.

Veronica serpyllifolia L. By streamlet, Hay Cove.

Euphrasia purpurea Reeks, var. Randii (Rob.) Fernald & Wiegand. Hillside, Martin Power's Cove. Abundant.

E. purpurea Reeks, var. Randii (Rob.) Fernald & Wiegand, f. albiflora Fernald & Wiegand. Hillside, Martin Power's Cove.

E. purpurea Reeks, var. Farlowii (Rob.) Fernald & Wiegand. Barrens.

E. americana Wettst. Field, Atlantic Cove. Frequent.

E. canadensis Townsend. Field, Atlantic Cove. Abundant.

*Rhinanthus groenlandicus Chabert. Near ruins of an old house, Trinity Cove. Not noted elsewhere on the barren.

This boreal species is represented in the Gray Herbarium by specimens from Greenland, Labrador, western Newfoundland, Quebec (Saguenay Co.), Anticosti, the Mingan Islands and Alaska.

R. Crista-galli L., var. fallax (Wimmer & Grab.) Druce. Abundant in fields, Atlantic Cove.

Utricularia geminiscapa Benj. Lena Lake.

U. minor L. Pools of streamlet between Petrie's Pond and White Spring.

The specimens differ from those of the typical form in having bladders somewhat larger than usual and flattened rather than terete leaves. Possibly they correspond to f. *platyloba* Meister, which is merely the result of an ecological reaction to creeping out on the mud.

*U. ochroleuca R. Hartm. Lena Lake.

This dainty little plant is most closely related to *U. intermedia*, which ordinarily may be identified by the fact that the bladders are borne on separate leafless branches. *U. ochroleuca*, too, has separate

bladder-bearing leafless branches, but it differs from its relative in bearing bladders also on the leaves of the immersed stems; moreover, the teeth along the margins of the leaves are larger than those characteristic of *U. intermedia*. Unfortunately our specimens are sterile, but Glück intimates that sterility is not an unusual occurrence in this species. *U. ochroleuca* is fairly common in the northern countries of Europe. It has been reported from two localities in Greenland, but this is the first record south of there; hence, it is not only an addition to the flora of Nova Scotia but also to that of Canada.

Pinguicula vulgaris L. Banks of streamlet between Petrie's Pond and White Spring.

Found also on Cape Breton, but not elsewhere in the province.

Plantago juncoides Lam. toward var. laurentiana Fernald. Rocks, North East Light.

P. juncoides Lam., var. glauca (Hornem.) Fernald. Hillside, Martin Power's Cove.

P. juncoides Lam., var. decipiens (Barneoud) Fernald. Barrens. Common.

P. major L. Field, Atlantic Cove.

Galium triflorum Michx. Woods near the Radio Station.

G. Claytoni Michx. Common in swamps and wet open places.

Mitchella repens L. Near the outlet of Lena Lake.

Lonicera villosa (Michx.) R. & S., var. Solonis (Eaton) Fernald. Margin of peat bog at head of White Spring.

L. canadensis Marsh. Woods near Ethel Lake.

This is the northeastern limit of its range.

Linnaea borealis L., var. americana (Forbes) Rehder. Abundant in the forest.

Viburnum cassinoides L. Casual on the southern part of the island.

Sambucus racemosa L. Open places in the woodland.

Campanula rotundifolia L. Hillside, Martin Power's Cove. In this locality we found one white-flowered form. The typical was abundant near cliffs.

*C. rotundifolia L., var. alaskana Gray. Rocky slopes.

This Alaskan variety has been collected east of British Columbia only in western Newfoundland and Gaspé (one collection), and, now, St. Paul (Nova Scotia).

Lobelia Dortmanna L. Ethel Lake.

The specimens differ slightly from the typical in the more pubescent lip of the corolla.

Solidago bicolor L. Rocky slope above South West Light.

S. MACROPHYLLA Pursh. Open forest. Fairly common.

S. PUBERULA Nutt. Woodland near Martin Power's Cove.

*S. MULTIRADIATA Ait. Barren southwest of N. E. Channel.

Distributed in the west from Manitoba to Alaska. In the east, reported from western Newfoundland and Quebec (Gaspé and Matane counties).

S. SEMPERVIRENS L. Both near and on cliffs.

S. UNILIGULATA (DC.) Porter, var. NEGLECTA (T. & G.) Fernald. Peat bog at the head of White Spring.

S. RUGOSA Mill., var. SPHAGNOPHILA Graves. Wet gulch, Norwegian Mountain.

ASTER LATERIFLORUS (L.) Britton. Woods, Atlantic Cove.

A. RADULA Ait. Swamp, Atlantic Cove. Part of the specimens collected approach var. STRICTUS.

A. NOVI-BELGII L. Casual on the barren.

A. UMBELLATUS Mill. General in open places.

A. ACUMINATUS Michx. Open woodland.

A. NEMORALIS Ait. Margin of Lena Lake.

A. NEMORALIS Ait., var. MAJOR Peck. Margin of Lena Lake, growing with the typical form.

ANAPHALIS MARGARITACEA (L.) B. & H. Hillside, Atlantic Cove.

A. MARGARITACEA (L.) B. & H., f. ANOCHLORA Fernald. Barren, Trinity Cove southwest.

Gnaphalium uliginosum L. Waste places, Atlantic Cove.

Achillea Millefolium L. Clearing near South West Light.

Matricaria suaveolens (Pursh) Buchenau. Hillside, Atlantic Cove.

Chrysanthemum Leucanthemum L., var. *pinnatifidum* Lecoq & Lamotte. Abundant in the fields, Atlantic Cove.

CIRSIUM MUTICUM Michx. Casual. Only three or four specimens seen.

C. arvense (L.) Scop. Swale, base of Norwegian Mountain.

Centaurea nigra L. Field, Atlantic Cove.

Leontodon autumnalis L., var. *pratensis* (Link) Koch. Weed, Atlantic Cove.

Taraxacum officinale Weber. Atlantic Cove.

PRENANTHES TRIFOLIOLATA (Cass.) Fernald. In open forest and along borders. Common.

P. TRIFOLIOLATA (Cass.) Fernald, var. NANA (Bigel.) Fernald. Barren, Trinity Cove.

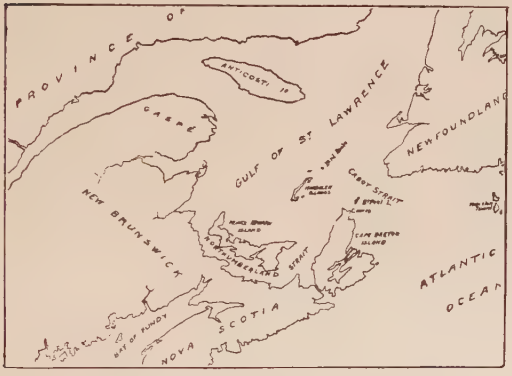
GRAY HERBARIUM.

THE ALGAE OF ST. PAUL ISLAND[1]

Muriel V. Roscoe

(Plate 208)

While on a month's expedition to St. Paul Island with Miss Lily Perry during the summer of 1929, the writer undertook to make a collection of the marine algae. Very little attention has been given to the algal flora of the Canadian regions and the idea is current that it is of little interest. That of St. Paul revealed more of variety than would perhaps be anticipated.



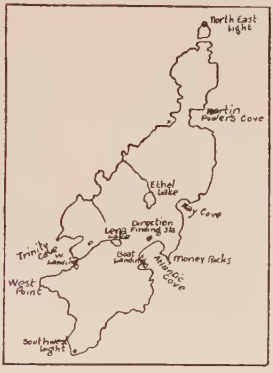


Fig. 1 (left). Gulf of St. Lawrence, showing location of St. Paul Island (in Cabot Strait). Fig. 2 (right). St. Paul Island.

St. Paul is a small island lying in Cabot Strait some twelve miles north-east of Cape North, the most advanced outpost of Nova Scotia (fig. 1). It is about fifty miles distant from Cape Ray, the nearest Newfoundland point. Since it lies in the pathway not only of all boats passing up the St. Lawrence from southern ports, but also of European liners at those seasons when the Strait of Belle Isle is not a feasible route, this island has acquired much importance in navigation. From the earliest history of St. Lawrence shipping it has proved a menace to ocean traffic. Thus, very early, the Canadian Government established two light-houses on the island as well as a fog alarm and a well-equipped life-station. In 1924 the latter was replaced by a direction-finding station.

With an extreme length of no more than four miles and a width

[1] Contribution from the Department of Botany, Acadia University.

which varies from one-half a mile to a mile, the island has no claim to size. It rises abruptly from the ocean bed from depths of about 250 fathoms. The shore line is characterized by formidable cliffs which rise perpendicularly to heights varying between 50 and 100 or even 150 feet. These form in general an insurmountable barrier to land approach. West Landing in Trinity Bay and the Boat Landing in Atlantic Cove are exceptions (FIG. 2).

The entire island is rough and bold, with the highest of its hills, Mt. Coggin, reaching a height of 550 feet. Perched high above sea-level and shut in among the hills are two bodies of water known as Ethel Lake and Lena Lake. Streams forming outlets from the lakes are surprisingly small. Thus the main outlet of Ethel Lake leading to the west side of the island was found to be, even at its source, little more than a foot in width. A second outlet, the tiniest of streamlets, drained eastward and eventually trickled over the rocky precipice at Kay Cove. As a whole, natural drainage of the island is slight and the water for the most part is retained in the soil which is a thin, superficial covering over the huge rock. It was thus an anomaly to find an island with such steep inclines and an abundant supply of water and yet with so little opportunity for its escape.

The island suffers all the rigors of climate which its location would suggest. Dense fogs, high winds and severe winter storms are its lot. During the winter months, the drift ice of the St. Lawrence very effectively shuts it off from communication with the mainland. This pan ice is in cakes about six feet in thickness. Its effect upon the algae is conjectural, but doubtless it quite effectively scours off and removes at least the intertidal zone forms.

The temperature of the surface waters in these regions ranges from 55 to 65 degrees fahrenheit in summer.[1] Since the St. Paul spring tides are but four feet high and the neaps but three feet,[2] the exposure of algae at low tide is not great. There is an outward current from the Gulf which is here known as the Cape Breton Current and which attains a speed varying between ½ knot and 1½ knots an hour.[3]

Once arrived, it was apparent to us that the algae would be relatively inaccessible. In the absence of a boat, it was necessary to confine most of the collecting to two regions, Trinity Cove (at West Landing)

[1] The Currents in the Gulf of St. Lawrence. Dept. of Naval Service. Ottawa. 1913.
[2] Tide Tables for the Eastern Coasts of Canada for the year 1929. Dept. of Marine and Fisheries. Ottawa.
[3] The Currents in the Gulf of St. Lawrence. Dept. of Naval Service. Ottawa. 1913.

and Atlantic Cove (at Money Rocks and the Boat Landing). A third region, on the west side of Martin Power's Cove, did not add anything to the collection made at the former points. A fourth collecting ground was the salt spray pools in the rocks at the North East Light. These slightly saline pools are at least 100 feet above the sea, and receive from the sea only the spray thrown up during very high storms. They yielded a rich growth of *Enteromorpha intestinalis* and also abundant mats of *Rhizoclonium tortuosum* and *R. riparium*, the latter a species not found elsewhere during the month.

It is apparent that the collections do not necessarily represent an inclusive list of the marine algae of the island. And yet, since the accessible regions were also in the most protected areas, it is felt probable that few forms escaped detection.

The most favorable place for algal growth on the entire shore appeared to be at Money Rocks (PL. 208, FIGS. 1 and 2). Here the large rocks project outward into the water in a gradual enough fashion to enable collecting to be done at low tide both from the outer rocks and in the inner tide pools. On the outer rocks, an abundance of *Scytosiphon* and *Chordaria* plants were clinging to the exposed faces. In the inner pools, several species of greens such as *Chaetomorpha Melagonium*, *Enteromorpha intestinalis* and *Rhizoclonium tortuosum* formed dense growths. In the outer deep channels, through which constantly surged even at low tide the strongest of currents, the hardy kelps found a favorable location.

Money Rocks, fortunately, is directly in front of the Direction Finding Station (PL. 208, FIG. 2) and since this was our headquarters for pressing and drying operations the proximity of the collecting ground was an asset. Collecting was expediated because confined to a small area. It was however rendered both difficult and hazardous by the roughness of the coast, the precipitousness of the rocks and even in the most favorable places by the strength of the local currents and the force of the waves.

Although the Money Rocks region was considered the best for variety of forms, the greatest abundance of any species observed was at the Atlantic Cove Boat Landing, where great quantities of *Chordaria* formed dense coverings over all the rocks. By far the best *Alaria* and *Laminaria* specimens were secured here in the wash after a heavy storm, and along with these were splendid specimens of *Agarum*. Since one expects *Fucus* and *Ascophyllum* in cold northern waters, the lack of any abundant growth of these was striking.

The only fresh water forms collected belong to the genus *Batrachospermum*. The abundance of *B. vagum* in Ethel Lake, where it formed a dense growth over the rocks in shallow water, calls for special comment. Also, a second species, *B. moniliforme*, was discovered in the streamlet draining into Kay Cove.

In all, some thirty-nine species and varieties have been identified as follows:

Chaetomorpha Melagonium forma rupincola Aresch.
Cladophora flexuosa (Griff.) Harvey
Cladophora rupestris (L.) Kützing
Enteromorpha intestinalis (L.) Grev.
Rhizoclonium riparium (Roth) Harvey
Rhizoclonium tortuosum Kuetz.
Spongomorpha arcta (Dillw.) Kützing

Agarum Turneri Post. & Rupr.
Alaria esculenta (L.) Grev.
Ascophyllum nodosum (L.) Le Jolis
Chorda Filum (L.) Stack.
Chordaria flagelliformis (Fl. Dan.) Ag.
Desmarestia viridis (Fl. Dan.) Lamour.
Dictyosiphon hispidus Kjellm.
Dictyosiphon foeniculaceus var. americanus Collins
Elachistea fucicola (Velley) Fries
Fucus filiformis Gmelin

Fucus vesiculosus L.
Fucus vesiculosus var. laterifructus Grev.
Fucus vesiculosus var. sphaerocarpus J. Ag.
Laminaria digitata (L.) Lamour.
Laminaria saccharina (L.) Lamour.
Leathesia difformis (L.) Aresch.
Pylaiella littoralis (L.) Kjellm.
Sacchoriza dermatodea (De la Pyl.) J. Ag.
Scytosiphon lomentarius (Lyng.) J. Ag.

Ahnfeltia plicata (Huds.) Fries
Batrachospermum moniliforme Roth
Batrachospermum vagum (Roth) Ag.
Ceramium rubrum (Huds.) Ag.
Chondrus crispus (L.) Stack.
Corallina officinalis L.
Halosaccion ramentaceum (L.) J. Ag.
Phymatolithon compactum (Kjellm.) Fosl.
Polysiphonia urceolata (Lightf.) Grev.
Polysiphonia violacea (Roth) Grev.

PTILOTA PECTINATA (Gunner) Kjellm.
RHODOMELA SUBFUSCA (Woodw.) Ag.
RHODYMENIA PALMATA (L.) Grev.

In addition to *Spongomorpha arcta* of usual size and appearance from the rocks at the Boat Landing, some specimens with filaments 100–150 micra broad and 7–8 cm. long were obtained in the wash at Money Rocks. The *Rhodomela subfusca* was not altogether characteristic. Howe indicates that "it leans a little toward the variety *gracilior*." It was not anticipated that any *Polysiphonia* would appear in the region. Although not abundant, the specimens of *P. urceolata* and *P. violacea* denote that the genus is at least represented.

I am grateful to Dr. W. R. Taylor for checking the collection and for his assistance in identifying some of the more difficult species. I am indebted also to Dr. Marshall A. Howe for final determination of species of *Phymatolithon*, *Spongomorpha* and *Rhodomela*.

ACADIA UNIVERSITY,
WOLFVILLE, NOVA SCOTIA.

ANOTHER STATION FOR PANICUM CALLIPHYLLUM ASHE.—On July 29, 1928 I accompanied Mr. Clarence H. Knowlton in a short botanizing trip around East Weymouth, Massachusetts, one of several trips that summer, where I benefited greatly by his expert guidance. One of the areas explored was composed of innumerable tongues of salt meadow, from which rose steep little wooded ridges, with a distinctly richer, less sandy soil than the prevalent type along the South Shore. On one of these steep hillsides in dense shade, we happened to notice a good sized patch of a large *Panicum*, which struck us as not being "quite right" either in appearance or habitat for *P. clandestinum*, and after some discussion as to what it might be, specimens were collected on general principles. That night while putting the day's collection in press, I was surprised to be quite unable to "key" the grass in either Gray's Manual or Britton and Brown. One day last spring I brought a package of such puzzles to the Gray Herbarium, where, however, my labors were shortened by the kindly interest of Professor Fernald, who with his usual acumen named it offhand as *Panicum calliphyllum*.

This species of *Panicum* has been collected on a very few occasions only, Ontario, once; Ohio, once; central New York, once or perhaps

twice; eastern Massachusetts (Medford, West Roxbury, and Lakeville, Plymouth Co.). This scattered and peculiar distribution is strikingly like that of a small group of relict species discussed by Fernald (Amer. Journ. of Botany, vol. 5, 1918, p. 225), of which *Cyperus Engelmanni* is one.

In a very difficult and "finely split" genus, it is a refreshingly distinct species. Technically its affinities are with the rare and local *P. Bicknellii,* but the spikelets are longer (3mm.) and the blades wider (up to 12 mm.). In the field, however, it would be passed over nine times out of ten for *P. clandestinum,* because of its large spikelets, unless it was being specially sought for. It may be separated in the field from *P. clandestinum* on the following counts:—(1) the blades average distinctly narrower; (2) the plant is bright (almost yellowish) green instead of dull grayish green, a difference noticeable in properly dried specimens; (3) the sheaths are never swollen, and absolutely smooth; (4) the panicle is few-flowered, consisting of a few, stiff, ascending branches, whereas in *P. clandestinum,* the branches are long and flexuous; (5) the spikelets tend to be long-pedicelled, instead of on short peduncles.

A duplicate sheet has been given to the Gray Herbarium, my no. 12430.—*Ludlow Griscom,* Cambridge, Mass.

Volume 33, no. 388, including pages 81 to 104 and plates 206 and 207, was issued 10 April, 1931.

FIGS. 1 AND 2. MONEY ROCKS, ST. PAUL ISLAND

NOTICE TO CONTRIBUTORS

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